

IN THE CLAIMS

A listing of all active claims is provided below.

Claim 1 (Previously Presented): A liquid crystal display device comprising

- a pair of substrates, at least one of which is transparent;
- a liquid crystal layer between the pair of substrates;
- a group of electrodes formed on at least one of the substrates and adapted to apply an electric field to said liquid crystal layer, wherein the electric field has a component substantially parallel to the surfaces of the substrates;
- and an alignment layer disposed between the liquid crystal layer and at least one of the substrates,

wherein the alignment layer has been subjected to liquid crystal anchoring treatments in plural directions to form a plurality of liquid crystal in-plane anchoring directions,

the plurality of liquid crystal in-plane anchoring directions of the alignment layer form substantially equal angles relative to one another on the corresponding substrate surface,

a pretilt angle in each of the liquid crystal anchoring directions with respect to the corresponding substrate surface is substantially zero.

Claim 2 (Withdrawn): A liquid crystal display device comprising

- a pair of substrates, at least one of which is transparent;
- a liquid crystal layer between the pair of substrates;
- a group of electrodes formed on at least one of the substrates and adapted to apply an electric field to the liquid crystal layer, the electric field having component substantially parallel to the surfaces of the substrates; and
- an alignment layer disposed between the liquid crystal layer and at least one of the substrates

wherein the alignment layer has been subjected to liquid crystal anchoring treatments in two directions to form two liquid crystal in-plane anchoring directions;

the two liquid crystal in-plane anchoring directions of the alignment layer form an angle of about 90° relative to each other on the corresponding substrate surface;

a pretilt angle in one liquid crystal anchoring direction with respect to the corresponding substrate surface is substantially zero,

a pretilt angle in the other liquid crystal anchoring direction with respect to the corresponding substrate surface is not substantially zero; and

the device is capable of maintaining two stable in-plane alignment states of the liquid crystal layer even after the removal of the applied electric field.

Claim 3 (Previously Presented): A liquid crystal display device according to claim 1, wherein at least one of the liquid crystal anchoring treatments in plural directions comprises performing uniform anchoring treatment over an entire target area in each of the in-plane directions.

Claim 4 (Previously Presented): A liquid crystal display device according to claim 1, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises

dividing an entire target area into plural sub-areas corresponding to the plural in-plane directions and

performing anchoring treatment in each of the sub-areas in the corresponding in-plane direction.

Claim 5 (Previously Presented): A liquid crystal display device according to claim 1, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises

irradiating the alignment layer with linearly polarized light which is capable of causing a chemical reaction on the surface of the corresponding substrate.

Claim 6 (Previously Presented): A liquid crystal display device according to claim 1, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises

scanning the alignment layer with a probe which is capable of imparting stress to the surface of the corresponding substrate.

Claim 7 (Previously Presented): A liquid crystal display device according to claim 1, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises

scanning the alignment layer with light which is capable of causing a chemical reaction on the surface of the corresponding substrate.

Claim 8 (Withdrawn): A liquid crystal display device according to claim 1, wherein the liquid crystal layer comprises a liquid crystal material which comprises chiral molecules.

Claim 9 (Withdrawn): A liquid crystal display device according to claim 1, wherein the liquid crystal layer comprises a liquid crystal material having a positive or negative dielectric anisotropy depending on the frequency of an applied AC electric field.

Claim 10 (Withdrawn): A liquid crystal display device according to claim 1, further comprising an additional electrode on each of the substrates wherein the additional electrodes form a pair.

Claim 11 (Withdrawn): A liquid crystal display device according to claim 1, further comprising a light reflection plate on one of the substrates.

Claim 12 (Withdrawn): A liquid crystal display device according to claim 2, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises performing uniform anchoring treatment over an entire target area in each of the in-plane directions.

Claim 13 (Withdrawn): A liquid crystal display device according to claim 2, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises dividing an entire target area into plural sub-areas corresponding to the plural in-plane directions and performing anchoring treatment in each of the sub-areas in the corresponding in-plane direction.

Claim 14 (Withdrawn): A liquid crystal display device according to claim 2, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises irradiating the alignment layer with linearly polarized light which is capable of causing a chemical reaction on the surface of the corresponding substrate.

Claim 15 (Withdrawn): A liquid crystal display device according to claim 2, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises scanning the alignment layer with a probe which is capable of imparting stress to the surface of the corresponding substrate.

Claim 16 (Withdrawn): A liquid crystal display device according to claim 2, wherein at least one of the liquid crystal anchoring treatments in plural in-plane directions comprises scanning the alignment layer with light which is capable of causing a chemical reaction on the surface of the corresponding substrate.

Claim 17 (Withdrawn): A liquid crystal display device according to claim 2, wherein the liquid crystal layer comprises a liquid crystal material which comprises chiral molecules.

Claim 18 (Withdrawn): A liquid crystal display device according to claim 2, wherein the liquid crystal layer comprises a liquid crystal material having a positive or negative dielectric anisotropy depending on the frequency of an applied AC electric field.

Claim 19 (Withdrawn): A liquid crystal display device according to claim 2, further comprising an additional electrode on each of the substrates wherein the additional electrodes form a pair.

Claim 20 (Withdrawn): A liquid crystal display device according to claim 2, further comprising a light reflection plate on one of the substrates.

Claim 21 (Previously Presented): The liquid crystal display device according to claim 1, wherein the device is capable of maintaining a plurality of stable in-plane alignment states of the liquid crystal layer even after the removal of the applied electric field.